

REMARKS

In the specification, the paragraph immediately following the Title, which was added by way of the March 1, 2002 Preliminary Amendment, has been amended to correct inadvertent errors in the name of the Government agency which provided support to the inventor. It is respectfully submitted that no new matter has been introduced into the present application by this Amendment.

Upon entry of this Amendment, Claims 1-3, 5-20, 22-30, 32, 33, 36, 38-41, 47-62, with Claims 1, 11, 22, 26, 40, and 61 in independent form, will be pending in the present application for consideration. Claims 4, 21, 31, 34, 35, 37, and 42-46 have been canceled by the present Amendment without prejudice to Applicant's right to seek the claims of comparable scope in one or more future related applications. Claims 47-54 have been added by the present Amendment to better capture the invention disclosed in the present application, in particular the invention disclosed in pars. [0049]-[0052]¹ and FIGS. 4-6 of the specification; and Claims 55-62 have been added by the present Amendment to capture the invention disclosed in par. [0095] and FIG. 5 of the specification. Claims 1-3, 9-20, 22-30, 33, 36, and 38-41 have been amended by the present Amendment to clarify and better capture the invention to which these claims are directed as disclosed in the specification. Claim 32 has been amended in part to address the Examiner's Section 112 rejection thereto, as discussed below. Favorable

¹ Applicants respectfully note that paragraph numbers of the specification cited in this Amendment correspond to the paragraph numbers appearing in U.S. Patent Application Publication No. US 2002/0113753 A1 associated with the present application. Applicants also respectfully note that the Preliminary Amendment filed on March 1, 2002 added a paragraph to the specification (which is amended herein), which does not appear in the published application.

consideration and allowance of all of the pending claims in view of the foregoing amendments and the following remarks are respectfully requested.

Applicants respectfully respond to the Office Action dated March 23, 2004 as follows:

Drawings

In the Office Action, the Examiner objected to the drawings under 37 C.F.R. § 1.83(a) on the ground that the “shutter,” “heater,” and “computer” as specified in the claims are not shown in the drawings. Applicants respectfully traverse the Examiner’s objections.

FIG. 1 of the present application shows one possible embodiment of the transient light scattering shutter. The term “shutter” as used in this application is defined by the specification as follows: “Liquid crystal shutters are electro-optic devices that are electrically switchable between a transparent state and a light scattering state by varying an electric field.” (Par. [0003]). FIG. 1 shows a liquid crystal cell 2 of a light scattering shutter, wherein a liquid crystalline light modulating material layer 27 that is electrically switchable between a transparent state and a transient light scattering state by varying an electric field. (See Pars. [0036]-[0044]). Furthermore, FIG. 1 shows a voltage source 29 and electrical conductors 60 and 61 connecting the voltage source 29 to the liquid crystal cell 2. The voltage source 29 provides a varying electrical field that controls the optical scattering of the liquid crystalline material of the liquid crystal cell 2. (See pars. [0042]-[0044]). Accordingly, Applicants respectfully submit that FIG. 1 shows a “shutter,” as recited in the claims.

In addition, Applicants respectfully submit that FIG. 1 shows the “heater” in the form of conducting layers 9 and/or 11 in the liquid crystal cell 2 of a light scattering shutter. The specification discloses that “the conducting layer, made from ITO for example, is slightly resistive, and can be used to heat the liquid crystalline material,” and that “[t]his embodiment has the advantage of providing intimate contact between the heater and liquid crystalline material as well as uniform spatial heating of the liquid crystalline material.” (Par. [0054]).

Applicants respectfully submit that the term “computer” no longer appears in any of the pending claims as amended and therefore the Examiner’s objection with respect to the term “computer” is now rendered moot.

Accordingly, Applicants respectfully submit that the drawings of the present application show every feature of the invention specified in the claims in compliance with 37 C.F.R. § 1.83(a). It is respectfully requested that the objection to the drawings be withdrawn.

Claim Rejections - 35 U.S.C. § 112:

In the Office Action, the Examiner rejected Claim 32 under 35 U.S.C. § 112 for lacking sufficient antecedent basis for “the ultraviolet spectrum,” “the near-infrared spectrum,” and “the infrared spectrum.” Claim 32 has been appropriately amended to eliminate the problem of lack of sufficient antecedent basis. Accordingly, it is respectfully requested that this rejection with respect to Claim 32 be withdrawn and this Claim be allowed.

Claim Rejections - 35 U.S.C. § 102:

In the Office Action, the Examiner rejected Claims 1 and 3-10 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,549,185 to Hatano (“the ‘185 Patent”). The rejection with respect to Claim 4 has been rendered moot by Applicant’s cancellation of this claim without prejudice. Applicants respectfully traverse the Examiner’s rejections with respect to Claims 1, 3, and 5-10.

Claim 1 is directed to a transient light scattering shutter comprising a liquid crystalline material comprising a chiral liquid crystal capable of forming a transient light scattering state and a transparent state, and a voltage source operative to switch the liquid crystalline material between the transparent state and the transient light scattering state. The specification of the present application defines the “transient light scattering state” as “an **unstable**, highly light scattering, liquid crystal texture formed by removing an electric field that causes the light scattering shutters of the invention to be transparent to incident light.” (Par. [0034]) (emphasis added). In FIG. 3(b), an example of the transient light scattering state of the liquid crystalline material is denoted by “S” and is compared to a more weakly scattering, stabilized equilibrium structure denoted by “S*.” The key characteristics of the transient light scattering state is that it is **not stable** when the electric field is off. (See par. [0045]). As FIG. 3(b) shows, after the applied voltage is turned off, the liquid crystalline material in the transient light scattering state S will eventually become stabilized and form an equilibrium structure S* after some period of time. (See par. [0045]). Accordingly, the unstable, highly light

scattering “transient” state (*i.e.*, “transient light scattering state” as defined in the specification) of the liquid crystalline material of the claimed transient light scattering shutter is one of the essential elements of Claim 1 of the present application.

In the Office Action, the Examiner cited FIGS. 2(B) and 3(A), Abstract, and Col. 6, lines 50-67 of the ‘185 Patent to support his position that the ‘185 Patent discloses the forming of a transient light scattering state in the liquid crystalline material. Applicants respectfully disagree and submit that none of the cited portions of the ‘185 Patent discloses a “transient light scattering state” of a liquid crystalline material or its use in a light shutter. According to its abstract, the ‘185 Patent is directed to a liquid crystal display to which a voltage pulse is applied to change the state of the liquid crystal layer and then, after some predetermined time, another voltage pulse is applied to set the liquid crystal layer to “a **stable** state.” (Abstract) (emphasis added). FIG. 3(A) shows a sequence of two voltage pulses to achieve such objective, and FIG. 2(B) and Col. 6, lines 50-67 of the ‘185 Patent merely describe the magnitude of an applied voltage needed to attain a transmissive state or a scattering state.

Unlike the present application, numerous references by the ‘185 Patent to stable states of a liquid crystal material, as quoted below, clearly indicate that the ‘185 Patent only teaches transitions between **stable states** in a liquid crystal layer:

. . . the driver applying a first voltage pulse for changing a state of the liquid crystal layer and after a predetermined lapse of time further applying a second voltage pulse to set the liquid crystal layer to a **stable state** (Col. 2, lines 29-32) (emphasis added).

A method for driving a liquid crystal display having a pair of plates with electrodes and a liquid crystal layer retained between the plates, including the steps of applying a first voltage pulse to the electrodes of the liquid crystal display to change a state of the liquid crystal layer, and applying, upon elapsing of a predetermined time after application of the first voltage pulse, a second voltage pulse to the electrodes to set the liquid crystal layer to a **stable state** (Col. 2, lines 53-60) (emphasis added).

A time required for **stabilizing** the liquid crystal at an intended optical state can be shorter than that in the conventional method . . . (Col. 3, lines 3-5) (emphasis added).

These two states [the transmissive state and the scattering state] are **stably** held for several months or more after interruption of the voltage, and therefore the bistability is exhibited (Col. 6, lines 27-30) (emphasis added).

[T]he intermediate transmittance state, i.e., the state of an intermediate transmittance is **stably** maintained if the pulse interval is lower than 20 msec (Col. 7, lines 13-16) (emphasis added).

In this case, the liquid crystal layer **stably** attained the scattering state regardless of the initial state (i.e., scattering state or transmissive state) (Col. 9, line 67--Col. 10, line 2) (emphasis added).

Therefore, the picture element 4 is **stabilized** in the transmissive state (Col. 10, lines 34-35) (emphasis added).

Thereby, an intermediate state 1 with the transmittance of 13% is **stably** attained regardless of the initial state (Col. 11, lines 44-46) (emphasis added).

Nowhere in the '185 Patent is there any teaching or even suggestion of an unstable "transient light scattering state" of a liquid crystalline material or its use in a light shutter.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference. See MPEP 2131. Since the '185 Patent does not disclose, either expressly or inherently, a "transient light scattering state" of a liquid crystalline material, let alone its use in a light shutter, Applicants respectfully submit that the '185 Patent cannot anticipate Claim 1 of the present application. Furthermore, Claims 3, and 5-10 dependent on Claim 1 and incorporating all of its elements cannot be anticipated by the '185 Patent either. Accordingly, it is respectfully requested that the Examiner's rejection of Claims 1, 3, and 5-10 under 35 U.S.C. § 102(e) be withdrawn and that these Claims be allowed over the '185 Patent.

Claim Rejections - 35 U.S.C. § 103:

In the Office Action, the Examiner rejected Claim 2 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of U.S. Patent No. 4,639,722 to Urabe et al. ("the '722 Patent"). Applicants respectfully traverse the Examiner's rejection with respect to Claim 2 over prior art.

To establish *prima facie* obviousness of a claimed invention under 35 U.S.C. § 103(a), all the claim limitations must be taught or suggested by the prior art. MPEP 2143.03. As in Claim 1, on which Claim 2 depends, the transient light scattering state

of a liquid crystal material is an essential element of Claim 2. However, as discussed above, the '185 Patent does not teach or suggest at all an unstable "transient light scattering state" in a liquid crystalline material, let alone its use in a light shutter. Nor does the '722 Patent teach or suggest the transient light scattering state of a liquid crystalline material and its use for a light scattering shutter.

Accordingly, the '185 Patent, alone or in combination with the '722 Patent, cannot render Claim 2 obvious. Therefore, it is respectfully requested that the Examiner's rejection of Claim 2 over prior art be withdrawn and Claim 2 be allowed over the '185 Patent and the '722 Patent.

The Examiner also rejected Claims 11, 13-16, 20, 22-23, 25-31, and 40-45 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of U.S. Patent No. 6,302,542 to Tsao ("the '542 Patent"). The rejection with respect to Claims 31, 34, and 42-45 has been rendered moot by Applicants' cancellation of these claims without prejudice. Applicants respectfully traverse the Examiner's rejection with respect to Claims 11, 13-16, 20, 22-23, 25-30, 40, and 41 over prior art.

As in Claim 1, the transient light scattering state of a liquid crystalline material is one of the essential elements of independent Claims 11, 22, and 40. However, as discussed above, the '185 Patent does not teach or suggest at all an unstable "transient light scattering state" of a liquid crystalline material, let alone its use in a light shutter.

Nor does the '542 Patent teach or suggest the transient light scattering state of a liquid crystalline material or its use in a light shutter.

Accordingly, the '185 Patent, alone or in combination with the '542 Patent, cannot render independent Claims 11, 22, and 40 obvious. MPEP 2143.03. Furthermore, if an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is also nonobvious. MPEP 2143.03. Therefore, Claims 13-16, 20, and 27-30 dependent on independent Claim 11, Claims 23 and 25 dependent on independent Claim 22, and Claim 41 dependent on independent Claim 40 cannot be rendered obvious by the '185 Patent, alone or in combination with the '542 Patent. Therefore, it is respectfully requested that the Examiner's rejection of Claims 11, 13-16, 20, 22-23, 25-30, 40, and 41 over prior art be withdrawn and these Claims be allowed over the '185 Patent and the '542 Patent.

The Examiner also rejected Claims 12, 24, and 33 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of the '542 Patent, as applied to Claims 11, 22, 26, and further in view of the '722 Patent. Applicants respectfully traverse the Examiner's rejection with respect to Claims 12, 24, and 33 over prior art.

As in independent Claims 11, 22, and 26, on which Claims 12, 24, and 33 respectively depend, the transient light scattering state of a liquid crystalline material is one of the essential elements of Claims 12, 24, and 33. However, as discussed above, neither the '185 Patent, nor the '542 Patent, nor the '722 Patent teaches or suggests the

unstable “transient light scattering state” of a liquid crystalline material, or its use in a light shutter.

Accordingly, the ‘185 Patent, alone or in combination with the ‘542 Patent and the ‘722 Patent, cannot render Claims 12, 24, and 33 obvious. MPEP 2143.03. Therefore, it is respectfully requested that the Examiner’s rejection of Claims 12, 24, and 33 over prior art be withdrawn and these Claims be allowed over the ‘185, ‘542, and ‘722 Patents.

The Examiner also rejected Claim 17 under 35 U.S.C. § 103(a) as being unpatentable over the ‘185 Patent in view of the ‘542 Patent as applied to Claim 11, and further in view of U.S. Patent No. 6,535,241 to McDowall et al. (“the ‘241 Patent”). Applicants respectfully traverse the Examiner’s rejection with respect to Claim 17 over prior art.

As in independent Claim 11, whose elements Claim 17 incorporates, the transient light scattering state of a liquid crystalline material is one of the essential elements of Claim 17. However, as discussed above, the ‘185 Patent and the ‘542 Patent do not teach or suggest at all an unstable “transient light scattering state” of a liquid crystalline material, let alone its use in a light shutter. Nor does the ‘241 Patent teach or suggest the transient light scattering state of a liquid crystalline material or its use in a light shutter.

Accordingly, the '185 Patent, alone or in combination with the '542 Patent and the '241 Patent, cannot render Claim 17 obvious. MPEP 2143.03. Therefore, it is respectfully requested that the Examiner's rejection of Claim 17 over prior art be withdrawn and this Claim be allowed over the '185, '542, and '241 Patents.

The Examiner also rejected Claims 18 and 19 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of the '542 Patent as applied to Claim 11, and further in view of U.S. Patent No. 6,469,683 to Suyama et al. ("the '683 Patent"). Applicants respectfully traverse the Examiner's rejection with respect to Claims 18 and 19 over prior art.

As in independent Claim 11, whose elements Claims 18 and 19 incorporate, the transient light scattering state of a liquid crystalline material is one of the essential elements of Claims 18 and 19. However, as discussed above, the '185 Patent and the '542 Patent do not teach or suggest at all an unstable "transient light scattering state" of a liquid crystalline material, let alone its use in a light shutter. Nor does the '683 Patent teach or suggest the transient light scattering state of a liquid crystalline material or its use in a light shutter.

Accordingly, the '185 Patent, alone or in combination with the '542 Patent and the '683 Patent, cannot render Claims 18 and 19 obvious. MPEP 2143.03. Therefore, it is respectfully requested that the Examiner's rejection of Claims 18 and 19 over prior art be withdrawn and these Claims be allowed over the '185, '542, and '683 Patents.

The Examiner also rejected Claims 21 and 46 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of the '542 Patent and further in view of the '722 Patent. The rejection with respect to these claims has been rendered moot by Applicants' cancellation of Claims 21 and 46 without prejudice.

The Examiner also rejected Claim 32 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of the '542 Patent as applied to Claim 26, and further in view of U.S. Patent No. 6,130,731 to Andersson et al. ("the '731 Patent"). Claim 32 has been amended by the present Amendment to depend on independent Claim 11. In the event that the Examiner believes that the above-mentioned prior art rejection is still applicable to Claim 32, Applicants respectfully traverse.

As in independent Claim 11, whose elements Claim 32 incorporates, the transient light scattering state of a liquid crystalline material is one of the essential elements of Claim 32. However, as discussed above, the '185 Patent and the '542 Patent do not teach or suggest at all an unstable "transient light scattering state" of a liquid crystalline material, let alone its use in a light shutter. Nor does the '731 Patent teach or suggest the transient light scattering state of a liquid crystalline material or its use in a light shutter.

Accordingly, the '185 Patent, alone or in combination with the '542 Patent and the '731 Patent, cannot render Claim 32 obvious. MPEP 2143.03. Therefore, it is

respectfully requested that the Examiner's rejection of Claim 32 over prior art be withdrawn and this Claim be allowed over the '185, '542, and '731 Patents.

In addition, the Examiner rejected Claims 35-39 under 35 U.S.C. § 103(a) as being unpatentable over the '185 Patent in view of the '542 Patent and further in view of the '722 Patent. The rejection with respect to Claims 35 and 37 has been rendered moot by Applicants' cancellation of these claims without prejudice. Claims 36, 38, and 39 have been amended by the present Amendment to depend on independent Claim 26, either directly or indirectly. In the event the Examiner takes a position that this rejection is still applicable to Claims 36, 38, and 39, Applicants respectfully traverse the rejection of these claims over prior art.

As discussed above, switching between a transparent state and a transient light scattering state of a liquid crystalline material is one of the essential elements of independent Claim 26. However, neither the '185 Patent, nor the '542 Patent, nor the '722 Patent teaches or suggests an unstable "transient light scattering state" of a liquid crystalline material or its use in a light shutter.

Accordingly, the '185 Patent, alone or in combination with the '542 Patent and the '722 Patent, cannot render independent Claim 26 obvious. MPEP 2143.03. Furthermore, if an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is also nonobvious. MPEP 2143.03. Therefore, Claims 36, 38, and 39 dependent on independent Claim 26 cannot be rendered obvious by the '185

Patent, alone or in combination with the '542 Patent and the '722 Patent. Therefore, it is respectfully requested that the Examiner's rejection of Claims 36, 38, and 39 over prior art be withdrawn and these Claims be allowed over the '185, '542, and '722 Patents.

Finally, in the event that the Examiner believes that any of the above prior art rejections is applicable to any of the newly added claims, Claims 47-62, Applicants respectfully traverse the rejection. As discussed above, the transient light scattering state of a liquid crystalline material is one of the essential elements of independent Claims 1, 11, 22, 40, and 61. However, neither the '185 Patent, nor any other cited prior art teaches or suggests the unstable "transient light scattering state" of a liquid crystalline material or its use in a light shutter.

Accordingly, the '185 Patent, alone or in combination with any other cited prior art, cannot render independent Claims 1, 11, 22, 40, and 61 obvious. MPEP 2143.03. Furthermore, if an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is also nonobvious. MPEP 2143.03. Therefore, Claims 47, 48, and 55-57 dependent on independent Claim 1; Claims 49-51 and 58-60 dependent on independent Claim 11; Claim 52 dependent on independent Claim 52; Claims 53 and 54 dependent on independent Claim 40; and Claim 62 dependent on independent Claim 61 cannot be rendered obvious by the '185 Patent, alone or in combination with any other prior art cited by the Examiner. Therefore, it is respectfully requested that the these Claims be allowed over the cited prior art.

* * *


In light of the foregoing amendments and remarks, Applicants respectfully request that a timely Notice of Allowance with respect to all of the pending claims, as amended and added by the present Amendment, be issued in this case.

Included herewith is a Petition for a Three-Month Extension of Time. A check in the amount of \$475.00 is also included herewith to cover the fee for the three-month extension of time for response for a small entity. No additional fees or extensions of time are believed to be due. However, authorization is given hereby to charge Deposit Account No. 01-1785 for any deficiency in fees necessary to preserve the pendency of the subject application, or to credit the same in case of overpayment.

Respectfully submitted,

AMSTER, ROTHSTEIN & EBENSTEIN LLP
Attorneys for Applicants
90 Park Avenue
New York, NY 10016
(212) 336-8000

Dated: New York, New York
September 22, 2004

By: 
Abraham Kasdan
Registration No.: 32,997